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Autore	Uzunca Murat
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Nota di contenuto	1 INTRODUCTION -- 1.1 Geological and computational background -- 1.2 Outline -- 2 DISCONTINUOUS GALERKIN METHODS -- 2.1 Preliminaries -- 2.2 Construction of IPG Methods -- 2.3 Computation Tools for Integral Terms -- 2.4 Effect of Penalty Parameter -- 2.5 Problems with Convection -- 3 ELLIPTIC PROBLEMS WITH ADAPTIVITY -- 3.1 Model Elliptic Problem -- 3.2 Adaptivity -- 3.3 Solution of Linearized Systems -- 3.4 Comparison with Galerkin Least Squares FEM (GLSFEM) -- 3.5 Numerical Examples -- 4 PARABOLIC PROBLEMS WITH TIME-SPACE ADAPTIVITY -- 4.1 Preliminaries and Model Equation -- 4.2 Semi-Discrete and Fully Discrete Formulations -- 4.3 Time-Space Adaptivity for Non-Stationary Problems -- 4.4 Solution of Fully Discrete System -- 4.5 Numerical Examples.-REFERENCES. .
Sommario/riassunto	The focus of this monograph is the development of space-time adaptive methods to solve the convection/reaction dominated non-stationary semi-linear advection diffusion reaction (ADR) equations with internal/boundary layers in an accurate and efficient way. After

introducing the ADR equations and discontinuous Galerkin discretization, robust residual-based a posteriori error estimators in space and time are derived. The elliptic reconstruction technique is then utilized to derive the a posteriori error bounds for the fully discrete system and to obtain optimal orders of convergence. As coupled surface and subsurface flow over large space and time scales is described by (ADR) equation the methods described in this book are of high importance in many areas of Geosciences including oil and gas recovery, groundwater contamination and sustainable use of groundwater resources, storing greenhouse gases or radioactive waste in the subsurface.